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Five hypotheses were tested in two longitudinal studies involving i/t/a used with primary-grade children in the Lompoc Unified School District of California. Parents were allowed to request i/t/a training, teachers were given instruction in i/t/a, and children received i/t/a training in first grade. Reading sections of the Stanford Achievement Test, Primary I, were given in both i/t/a and T.O. forms at the end of first grade, and T.O. forms were given at the ends of grades 2 and 3. Results concerning the five hypotheses showed (1) that i/t/a-trained children outperformed T.O.-trained children in grade 1, but not in grades 2 or 3; (2) that boys did not equal girls in achievement with i/t/a training; (3) that boys who were i/t/a-trained outperformed T.O.-trained girls in grade 1, but not in grades 2 or 3; (4) that older i/t/a- or T.O.-trained children outperformed younger children at grades 1, 2, and 3; and (5) that young i/t/a-trained children outperformed older T.O.-trained children in grade 1, but not in grades 2 or 3. Tables of test results are included. (MD)

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THE i/t/a IN LOMPOC: A LONGITUDINAL STUDY

Topic of Meeting: REPORT ON i/t/a
Friday, May 2, 1969 - 4:00-5:00 PM

RE001 880

During the school year 1962-63, correspondence between Glen Wegner, Superintendent of the Lompoc Unified School District in Lompoc, California, and John Downing of the University of London in England, regarding his experimentation with the Augmented Roman Alphabet, led Wegner to believe that the English experiment had relevance for the American school systems. In the Spring of 1963, discussions were held in the Lompoc Unified School District regarding the feasibility of introducing this new alphabet as a teaching tool to the staff and to the community. In the Summer of 1963, two representatives of our schools attended the workshops held for the

teachers at Bethlehem, Pennsylvania, where a formal research project involving the i/t/a was scheduled to commence in the school year, 1963-64. During the school year, 1963-64, in the Lompoc Unified School District, a number of individual tryouts of the i/t/a were undertaken. The teacher who had attended the conference at Bethlehem began a remedial program for third and fourth graders at her school building. Others in the school district, including remedial reading people at the secondary level, attempted to use the i/t/a with remedial cases at the junior high school level.

In the Spring of 1964, it was decided to experiment further at the first grade level during the school year, 1964-65. During that period two classrooms at the first grade level were taught to read using the i/t/a and additional remedial work was done in nine second and third grades as well as at the junior high school. A program was also begun in the adult evening school for foreign born illiterate adults using the i/t/a. The evaluation presented to the school board in the Spring of 1965 was encouraging. This led the board of trustees to authorize an optional program to be offered for first grade pupils. Parents were requested to give written consent to have their children taught to read using the i/t/a. That Spring, questionnaires went home with each kindergartner offering the parents this opportunity. An effort was also made to offer extensive discussion regarding the program and the various uses we had made of it during the previous two years. The film, "The Forty Sounds of English," was shown in the school district so that all parents might avail themselves of an opportunity to learn more about

the program. When the questionnaires were returned and tabulated, it was learned that approximately sixty percent of the children who were to be entering the first grade in the Fall of 1965 had permission to participate in the i/t/a program. During the Spring of 1966, questionnaires were once again sent home with kindergarten children and an orientation program was offered to parents with the option of placing their children in the following school year's first grade i/t/a program. The 1966-67 school year found approximately seventy percent of the first graders being introduced to reading through the i/t/a media. In the Spring of 1967, when a survey was taken of the district, it was found that over eighty percent of the parents were asking that their children be included in the i/t/a program. It was at this point that the Board of Trustees of the Lompoc Unified School District decided that the numbers of affirmative responses were great enough to warrant a transition to a total program at the first grade level. Therefore, for the first time in the school year, 1967-68, all children at the first grade level in the Lompoc Unified School District were offered reading using the i/t/a media.

Since large numbers of children were being introduced to reading with i/t/a, it was felt that some form of evaluation should be introduced which would give us continuous records regarding their progress. The data presented below is an examination of longitudinal data on pupil performance from a single battery of reading tests collected over a period of three years. The first group which began in 1965-66 has been tested in the spring of each school year through 1967-68. The second group that began their program in 1966-67 has been followed for the two years which they've been participants.

Procedure

In the Fall of 1965, twenty-eight teachers were trained in the use of the initial teaching alphabet in preparation for the introduction of the new program. Children whose parents requested their participation in the Spring of 1965 were assigned to either homogeneous or hetrogeneous groups. In buildings where large numbers of parents had selected the i/t/a program, an attempt was made to group the children homogeneously in terms of their reading readiness scores achieved in the kindergarten level and teacher judgment. Where numbers were too small to offer this type of ability separation, hetrogeneous groups were formed. Approximately sixty percent of the children in first grade during the 1965-66 school year were assigned to i/t/a groups. The remaining first graders were to be used as a control group to determine the effect that this new media had on the acquisition of reading skills.

The California State Legislature had mandated that all children in grades one and two in the state of California be tested with a single reading test in Spring, 1966. This presented an opportunity to test a number of hypotheses that had been formulated by some of those working with the new media. The State Department of Education furnished a state published edition of the Stanford Achievement Test, Primary I. This test contained only the reading sections found in the S.A.T. The publisher furnished national norms for the various subtests and prepared a set of norms to accommodate a "total reading summary" made up of the sum of the raw scores from "word reading" and "paragraph meaning." Two additional test sections were included in the battery that was sent out to the schools.

They were "vocabulary" and "word study skills." All children in grades one and two during the 1965-66 school year were tested in May of 1966.

Since this was the first large group of children to be tested with the S.A.T. at the end of the year after using i/t/a, Harcourt, Brace and World was asked whether they would be interested in gathering data on these children regarding their performance on an i/t/a transliterated version of the S.A.T. that they had prepared for another research project. The transliterated version was administered to one half of the children at the first testing, then ten days later they were given the traditional orthography (T.O.) version. This pattern was reversed for the other half of the group. In the homogeneous groups the assignment was made alphabetically. In the hetrogeneous groups "every other child" was given the i/t/a transliteration at the first testing. The data reported in Table 1 is based upon that half of the children who were given the T.O. version at the first administration. We found that the children who took the i/t/a transliteration first performed significantly better on the T.O. version ten days later. We, therefore, dropped them from our experimental group for the purpose of comparisons. Gains were anticipated as the result of using i/t/a. From our initial analysis we determined that the i/t/a-trained children had indeed outperformed the T.O.-trained children. Having satisfied the initial hypothesis, further analyses were undertaken to determine whether the i/t/a had a significant contribution to make in other areas. We, therefore, arranged to test the following hypotheses:

1) i/t/a would close the gap (mean differences) usually noted in reading performance between boys and girls.
2) i/t/a would close the gap (mean differences) frequently seen when older pupils' performances are compared with younger groups.
3) i/t/a groups would outperform T.O. groups when compared when sex is held constant and age is held constant.
4) Boys in the i/t/a group would do as well as, or better than, girls in the T.O. group.
5) Younger children in i/t/a would do as well as, or better than, older children in the T.O. group.

In order to test the strength of the mean differences, we applied Garrett's formula for deriving the critical ratio and determined our confidence level using a normal distribution table. A critical ratio of 2.58 is significant at the .01 level, and a critical ratio of 1.96 is significant at the .05 level of confidence in the normal distribution table.

During the school year 1966-67, a new group of first graders (approximately seventy percent of the first grade) was introduced to reading using the initial teaching alphabet. Once again data was collected for comparative purposes in the Spring of 1967. The first grade of 1965-66 was then sampled as the second grade of 1966-67.

Since the 1967-68 school year saw the introduction of i/t/a as a universal tool in the first grade, it was no longer possible to compare new groups coming into the program. However, data was collected for the third grade which had been our original first grade group, and for the second grade which had been our second first grade group. These data

are contained in the tables that follow. In all instances the same analyses were carried out using identical statistical procedures.

Findings - First Grade 1965-66

Insert Tables 1, 2 and 3

Table 1 displays the performance of grade one in 1965-66. Table 2 displays the performance of the same group the following school year in the second grade, and Table 3 shows this group's performance as third graders in 1967-68. As first graders the children in the i/t/a program demonstrated beyond the .01 level of statistical significance that their mean performance was better than children trained in the T.O. program. As second graders the performance of these i/t/a children as opposed to the T.O. children remains in favor of the i/t/a children, but the mean differences do not reach the level of statistical significance. By the third grade the differences are no longer significant, and a reversal of trend is seen in two sections of the test.

When we examined the performance of boys versus girls, regardless of the group -- be it i/t/a or T.O. -- we find girls consistently out-performing the boys throughout the three year period. By the third grade there is a "catching up" between T.O. boys and T.O. girls to a point where there is no significant difference between their performances. This is not true for the i/t/a group. The i/t/a girls' performances remain significantly better than the i/t/a boys.

In comparing the performance of young and old i/t/a and T.O. children we find that at the first grade level there is a trend in the

TABLE 1

CRITICAL RATIOS OF MEAN COMPARISON

Groups Compared	Larger Mean Scored By	1965-66 Grade 1 Word Read. C.R.	Par. Mean. C.R.	T. Reading C.R.	Vocabulary C.R.	Wd. Std. Sk. C.R.
I/t/a v.s. T.O.	I/t/a	9.16	4.10	6.52	2.85	7.70
TO boys - TO girls	girls	2.48	1.95	3.55	.06	2.34
Ita boys - ita girls	girls	3.04	3.58	3.48	.22	3.57
TO young - TO old	old	1.53	1.82	1.82	2.78	1.68
Ita young - ita old	old	1.33	.55	.94	2.20	.75
Ita boys - TO boys	ita boys	6.56	2.52	4.14	2.07	4.42
Ita girls - TO girls	ita girls	7.32	3.44	5.26	1.52	6.98
Ita young - TO young	ita young	6.30	3.41	4.86	2.12	5.76
Ita old - TO old	ita old	6.83	2.59	4.55	2.07	5.31
Ita boys - TO girls	ita boys	3.78	.72*	1.29	2.02	2.48
Ita young - TO old	ita young	5.18	2.05	3.50	(.40)	4.45

i/t/a N = 347
T.O. N = 665

*TO girls larger mean than ita boys
( ) TO old larger mean than ita young

Critical Ratio of 2.58 is significant at .01 level
Critical Ratio of 1.96 is significant at .05 level

CRITICAL RATIOS OF MEAN COMPARISON

Groups Compared	Larger Mean Scored By	1966-67 Grade 2 Word Mean. C.R	Par. Mean. C.R.	T. Reading C.R.	Wd. Std. Sk. C.R.
I/t/a v.s. T.O.	I/t/a	1.66	.03	.73	.74
TO boys - TO girls	girls	2.14	4.14	3.44	1.14
Ita boys - ita girls	girls	1.66	3.33	2.82	2.93
TO young - TO old	young	.02*	.04	.11	.49
Ita young - ita old	young	.58	.34	(.46)	.81
Ita boys - TO boys	ita boys	1.15	.07	.40	.56+
Ita girls - TO girls	ita girls	1.41	.48	.96	1.86
Ita young - TO young	ita young	1.53	.20	.75	1.08
Ita old - TO old	ita old	.81	.16-	.28	.20
Ita boys - TO girls	TO girls	.53	3.38	2.33	1.46
Ita young - TO old	ita young	1.59	.26	.88	1.24

i/t/a N = 416**
T.O. N = 866

*TO old larger mean than TO young
( ) ita old larger mean than ita young
+ TO boys larger mean than ita boys
- TO old larger mean than ita old

Critical Ratio of 2.58 is significant at .01 level
Critical Ratio of 1.96 is significant at .05 level

**This N is greater than first grade as only 50% of the i/t/a group were included in the analysis at first grade.

TABLE 3

CRITICAL RATIOS OF MEAN COMPARISON

Groups Compared	Larger Mean Scored By	1967-68 Grade 3 Word. Mean. C.R.	Par. Mean. C.R.	T. Reading C.R.	Wd. Std. Sk. C.R.
I/t/a v.s. T.O.	T.O.	.34*	1.46	.26	.67*
TO boys - TO girls	girls	.36	1.79	1.35	1.70
Ita boys - ita girls	girls	2.31	4.63	4.02	3.63
TO young - TO old	old	.12	.23	.26	.69
Ita young - ita old	old	1.12	.55	.85	.56
Ita boys - TO boys	TO boys	.76	2.65	2.08	.79
Ita girls - TO girls	ita girls	1.65	1.16	1.39	2.00
Ita young - TO young	TO young	.33	1.24	.98	(.39)
Ita old - TO old	TO old	.92+	.84	.24	.49+
Ita boys - TO girls	TO girls	1.04	4.06	3.17	2.13
Ita young - TO old	TO old	.40	1.39	1.13	.15

i/t/a N = 424
T.O. N = 825

*ita mean larger than TO mean
( ) ita young mean larger than TO young
+ ita old mean larger than TO old

Critical Ratio of 2.58 is significant at .01 level
Critical Ratio of 1.96 is significant at .05 level

direction of the old performing better, although few significant scores are seen. At second and third grade there are no significant differences between the means when younger and older children are compared.

An inspection of the Tables 1, 2 and 3 points up that i/t/a boys outperform T.O. boys, and i/t/a girls outperform T.O. girls very significantly in all but one section as first graders. In the second grade the same pattern persists of i/t/a boys and i/t/a girls performing better; however, none of the differences are statistically significant. In the third grade a surprising development occurs in that the T.O. boys begin to perform significantly better than the i/t/a boys on two sections of the test that was administered though the T.O. girls' performances do not reach the mean levels of the i/t/a girls.

In comparing i/t/a and T.O. young and i/t/a and T.O. old, the i/t/a children do consistently better at grades one and two. At grade one there are statistically significant differences; at grade two there are not. By the third grade, of the seven statistical tests run in these two categories, four are in favor of the T.O. and three are in favor of the i/t/a; none of them are statistically significant.

When i/t/a boys and T.O. girls were compared at the first grade, the i/t/a boys did as well as, or better than the T.O. girls in four of the five comparisons--three of which are statistically significant. At the second grade the T.O. girls move ahead and show statistically significant better performance than i/t/a boys on two of the four subtests. At the third grade level, once again, the T.O. girls outperform the i/t/a boys at a statistically significant level in three of the four subtests.

When i/t/a young and T.O. old were compared at the first grade, four of the five subtests were in favor of the i/t/a young and were statistically significant. At the second grade level all of the differences were in favor of the i/t/a young, but no differences reached the level of statistical significance. In the third grade the pattern reverses itself with the T.O. old moving ahead, having higher means, although no statistically significant results are found.

Discussion of Findings - First Grade 1965-66

It would appear that the initial impact in the group which started first grade in 1965-66 was such as to permit them to perform significantly better than the children taught to read with T.O. For this particular group the second and third grade performances suggest that the gains made in early reading had not held up. One point should be kept in mind, however, that only sixty percent of the 1965-66 i/t/a group was available for the testing in the second grade which may have some bearing on these findings. This, however, is not thought to be the primary reason for the apparent decrease in performance. Approximately sixty percent of the second graders of 1966-67 were available for retesting as third graders in 1967-68.

To get some idea as to the mean differences experienced in the two groups we will examine the "total reading" scores in greater detail. The total reading score for the i/t/a children as first graders was 44.16; for the T.O. group it was 36.66. As second graders the total reading score for the i/t/a group was 45.97, and for the T.O. group it was 45.14.

TABLE 4

CRITICAL RATIOS OF MEAN COMPARISON

Groups Compared	Larger Mean Scored By	1966-67 Grade 1 Word Read. C.R	Par. Mean. C.R.	T. Reading C.R.	Vocabulary C.R	Wd. Std. Sk. C R.
I/t/a v.s. T.O.	I/t/a	5.84	4.69	5.45	1.83	3.25
TO boys - TO girls	girls	4.44	6.34	5.78	1.09	4.02
Ita boys - ita girls	girls	3.31	3.96	3.34	.41*	2.58
TO young - TO old	old	2.58	1.30	1.53	1.31	1.64
Ita young - ita old	old	2.38	2.16	2.32	3.88	2.29
Ita boys - TO boys	ita boys	5.29	5.52	4.85	2.16	3.50
Ita girls - TO girls	ita girls	3.11	1.46	2.25	.49	1.20
Ita young - TO young	ita young	4.15	3.05	3.63	.47	2.24
Ita old - TO old	ita old	4.62	3.83	4.35	2.42	2.62
Ita boys - TO girls	ita boys	.26	(1.83)	(.94)	.88	(1.05)
Ita young - TO old	ita young	2.00	2.06	2.17	1.22+	.57

i/t/a N = 911
T.O. N = 386

*ita boys larger mean than ita girls
( ) TO girls larger mean than ita boys
+ TO old larger mean than ita young

Critical Ratio of 2.58 is significant at .01 level
Critical Ratio of 1.96 is significant at .05 level

TABLE 5

CRITICAL RATIOS OF MEAN COMPARISON

Groups Compared	Larger Mean Scored By	1967-68 Grade 2 Word Mean. C.R.	Par. Mean. C.R.	T. Reading C.R.	Wd. Std. Sk. C.R.
I/t/a v.s. T.O.	I/t/a	3.76	2.69	3.25	3.62
TO boys - TO girls	girls	4.57	5.90	5.49	3.39
Ita boys - ita girls	girls	1.93	3.70	3.13	2.16
TO young - TO old	young	.09*	1.36	.90	.87
Ita young - ita old	young	.51	.73	.65	.84
Ita boys - TO boys	ita boys	4.79	3.15	3.72	3.66
Ita girls - TO girls	ita girls	1.20	.85	1.40	1.73
Ita young - TO young	ita young	3.13	1.76	2.34	1.95
Ita old - TO old	ita old	2.13	2.28	2.37	2.55
Ita boys - TO girls	TO girls	.64	2.81	1.96	.19
Ita young - TO old	ita young	2.09	2.96	2.99	3.34

i/t/a N = 722
T.O. N = 506

*TO old larger mean than TO young

Critical Ratio of 2.58 is significant at .01 level
Critical Ratio of 1.96 is significant at .05 level

As third graders the total reading score was 63.70 for the i/t/a group and 63.96 for the T.O. group. Here we see the reversal occurring in the third grade; however, the raw score differences become almost meaningless in grades two and three since they are less than one point in size.

Further perusal of these three tables shows a distinct trend in the direction of diminishing returns. The i/t/a children, having started significantly better in all areas, have not been able to hold the gain that was experienced earlier. However, the trend has been toward an equalization within and between groups rather than a take-over by the T.O. trained children.

Findings - First Grade 1966-67

Insert Tables 4 and 5

Tables 4 and 5 display the performance of our second first grade group that we have followed now through the second grade. Perusal of these tables indicates that when comparing the total i/t/a and T.O. groups significant differences of means are found in all but one section of the first grade and all sections in the second grade in favor of the i/t/a children. Further examination of the material indicates that i/t/a girls continue to outperform i/t/a boys as do the girls in the T.O. groups both in the first and second grade. The pattern of T.O. old and i/t/a old doing significantly better in the first grade but not in the second grade is again observed with the reversal shown of the young "catching up" or being equal to the old by the end of the second grade. When i/t/a boys are compared with T.O. boys they do significantly better

as first graders and as second graders in this group. This is true of girls in the first grade with a level of significance disappearing in the second grade. Again when ages are compared across groups, the i/t/a young outperform the T.O. young both at first and second grade. This is true when i/t/a old and T.O. old are compared also. Of the eighteen statistical tests applied, only three of them fall short of significance at the .05 level. In comparing i/t/a boys to T.O. girls in the first grade the boys did as well as, or better than T.O. girls in two of the five subtests although none of them reached the level of significance. As second graders the i/t/a boys fall behind the T.O. girls, and two of the subtests are statistically significant. In examining i/t/a young in relation to the T.O. old as first graders the i/t/a young outperform the T.O. old in four of five of the subtests. The differences are statistically significant in three of the five. As second graders, the i/t/a young outperform the T.O. old in all subtests at a statistically significant level.

Discussion of Findings for the 1966-67 First Grade Group

The longitudinal prospect for the first grade that started in 1966-67 appears to be better than the first grade that was started in 1965-66. Approximately eighty-five percent of the i/t/a trained children of the class of 1966-67 was available for retesting as second graders in 1967-68. Looking more carefully at the mean scores achieved in grades one and two on the "total reading" section of the test, as first graders the i/t/a children scored a mean of 44.04 as opposed to 38.70 for the T.O. children. As second

graders the i/t/a mean was 46.79 as opposed to the T.O. children's mean of 43.35. In both instances the differences are large enough to be meaningful.

A further perusal of the data strongly suggests that the first grade which began in 1966-67 has succeeded in maintaining the momentum gained in the first grade.

Summary and Conclusions

Of the two i/t/a-trained classes which we have been following longitudinally, the second class appears to be doing considerably better on all dimensions that we've tested. Since we have been able to follow at least sixty percent of the first group and approximately eighty-five percent of the second group for more than one year, the data herein presented should be considered useful for generalization. The numbers of children involved include approximately 670 who started in the first grade 1965-66 and approximately 900 who started in the first grade 1966-67.

When we became aware of the fact that there was an apparent decline at the end of the second grade with the first group, an effort was made to encourage second grade teachers to try to maintain the gains realized in the first grade by introducing "above grade level" reading materials to the second graders. It would appear that this effort has paid off in that the second group's gains from the first grade appear to be sustaining.

As to our initial hypotheses and the findings, we can state with some confidence that i/t/a-trained children do outperform T.O.-trained children in the first grade. This does not seem to hold up well in second and

third grades if a special effort is not made to utilize above grade level reading materials. However, we strongly suspect that it is possible to maintain the early gains if curricular materials are introduced which support the early gains.

The next hypothesis indicating that i/t/a-trained boys would overtake the girls in reading performance has not been supported. We were briefly hopeful that the i/t/a program might in some way influence this particular phenomenon, but with three years of experience with large groups of children this has not been the case.

The third hypothesis through which we examined age differences strongly supports other data in that the older children do continue to do better even though we see a brief reversal of this in the second grade with our first group. The recovery is noted in the third grade.

When we examine the performances of boys and girls within groups, that is, i/t/a boys versus T.O. boys and i/t/a girls versus T.O. girls, we find a consistent pattern of i/t/a-trained children performing better except the boys at the third grade from our 1965-66 group.

When we tested the means for old and young groups, i/t/a versus T.O., we found consistently that the i/t/a children did better except in the third grade for our first group.

Our initial results in 1965-66 showing that boys did as well as, or better than girls when i/t/a was used for the boys and T.O. for the girls has been reversed in both groups. This finding has led to considerable disappointment as it was hoped that the i/t/a might prove to be a better tool for boys when used consistently.

The last comparisons we made testing the means of i/t/a young against T.O. old rather consistently demonstrates that the i/t/a young outperform the T.O. old except in our first group as third graders.

All the data we have collected to date for this longitudinal study leads us to believe that the i/t/a can be a very effective and useful tool for introducing reading to first graders. We also believe that in order to fully capitalize on the gains that are made in the first grade it is necessary for curriculum modification at the second and third grades. In general, this modification must be such as to go beyond the stated grade level for materials in order to continue to support the higher level of performance.